Amendments

In the Claims

1. (Withdrawn.) A method of measuring runout of a rotating tool, the method comprising:

illuminating with a rotating tool a coherent electromagnetic radiation, the tool having an axis and a reflective surface and completing a rotation in one period, the surface having a radial displacement from the axis of the rotating tool;

sensing a path of coherent electromagnetic radiation that is reflected from the reflective surface;

determining a maximum radial displacement based upon the sensed path;

determining a minimum radial displacement based upon the sensed path; and

determining a runout based upon the difference between the maximum radial displacement and the minimum radial displacement.

2. (Withdrawn.) The method of Claim 1, wherein sensing the path includes sensing a plurality of discrete sensations of the path in one period.

3. (Withdrawn.) The method of Claim 2, wherein:

the plurality is a first number;

sensing further includes:

selecting a second number that is greater than one and significantly smaller than the first number; and

averaging the sensed path over the second number of discrete sensations to determine an averaged path.

determining the maximum radial displacement based upon the sensed path further includes determining the maximum radial displacement based upon the averaged path; and

BLACK LOWE & GRAHAM PLLC
701 Fifth Avenue, Suite 4800
Seattle, Washington 98104
206.381.3300 • F: 206.381.3301

determining the minimum radial displacement based upon the sensed path further includes determining the minimum radial displacement based upon the averaged path.

4. (Withdrawn.) The method of Claim 3, wherein the averaged path is determined by a rolling average.

5. (Withdrawn.) The method of Claim 1, wherein the averaged path is based upon a rolling average.

6. (Withdrawn.) The method of Claim 1, wherein the radial displacement is determined by triangulation.

7. (Withdrawn.) The method of Claim 1, wherein the coherent electromagnetic radiation includes laser radiation.

8. (Withdrawn.) The method of Claim 1, wherein sensing includes triggering a photoactive element.

9. (Withdrawn.) The method of Claim 8, wherein sensing includes triggering a Capacitive Charge Device.

10. (Withdrawn.) The method of Claim 1, further comprising placing an indexing mark on the rotating tool prior to illuminating.

11. (Withdrawn.) The method of Claim 10, wherein:

determining the maximum displacement further includes determining a position of maximum displacement in relation to the indexing mark; and

determining the minimum displacement further includes determining a position of minimum displacement in relation to the indexing mark.

12. (Withdrawn.) The method of Claim 11, wherein the indexing mark is a scribed mark that is scribed on the surface of the rotating tool.

BLACK LOWE & GRAHAM PLLC
701 Fifth Avenue, Suite 4800
Seattle, Washington 98104
206.381.3300 • F: 206.381.3301

13. (Withdrawn.) The method of Claim 11, wherein the indexing mark is a paper shim affixed to the surface of the rotating tool.

14. (Currently Amended.) A device for measuring runout of a rotating tool, the device comprising:

a sensing unit including:

a source of coherent electromagnetic radiation, the source being configured to direct the coherent electromagnetic radiation at a surface of a rotating tool having an axis, the surface of the rotating tool being displaced from the axis by a displacement;

a sensor configured to receive reflected coherent electromagnetic radiation from the surface of the rotating tool such that the path of the reflected coherent electromagnetic radiation can be determined based upon the received coherent electromagnetic radiation; and

a transducer configured to produce a signal representative of the determined path of the reflected coherent electromagnetic radiation;

a processor in signal communication with the sensing unit, the processor being configured to receive the signal from the transducer;

a memory in signal communication with the processor, the memory containing a program of instructions to be executed by the processor, the program being configured to instruct the processor to receive the signal, to determine a rotation period of the tool, and to record in the memory a digital measurement of instantaneous signal amplitude at a plurality of instants within the rotation period, the instants occurring at a sampling frequency, the digital measurements from the period being arranged in a temporally ordered sequence, the temporally ordered sequences being stored as a pane associated with the rotation period, each pane

BLACK LOWE & GRAHAM PLLC
701 Fifth Avenue, Suite 4800
Seattle, Washington 98104
206.381.3300 • F: 206.381.3301

including an equal number of instants, ~~from the transducer and to determine the displacement based upon the instruction~~;

an averaging filter configured to average corresponding instants across a plurality of panes to generate an averaged pane and

an output device in signal communication with the processor and configured to indicate the determined displacement based upon the averaged pane.

15. (Currently Amended.) The device of Claim 14, wherein:

~~the rotating tool completes a rotations in one period;~~

~~the processor determines a plurality of displacements in the one period; and~~

the output device is further configured to an average based upon a selected number of sequential panes ~~indicates each displacement~~.

16. (Currently Amended.) The device of Claim 15, wherein the processor determines from the plurality of digital measurements in a pane ~~displacements~~, a maximum displacement and a minimum displacement.

17. (Original.) The device of Claim 16, wherein the processor determines a runout based upon a difference between the maximum displacement and the minimum displacement.

18. (Original.) The device of Claim 15, further including an indexing mark on the surface of the rotating tool.

19. (Original.) The device of Claim 18, wherein the indexing mark is scribed into the surface.

20. (Original.) The device of Claim 18, wherein the indexing mark is a paper shim.

21. (Original.) The device of Claim 15, wherein the plurality is a first number and wherein the processor designates a second number that defines a pane for determining an average displacement, the second number being significantly less than the first number and greater than zero.

BLACK LOWE & GRAHAM PLLC
701 Fifth Avenue, Suite 4800
Seattle, Washington 98104
206.381.3300 • F: 206.381.3301

22. (Currently Amended.) The device of Claim 21, wherein the output is configured to graphically indicate each of the digital measurements of the averaged panethe average displacement is rolled throughout the period.

23. (Currently Amended.) The device of Claim 22, wherein the output is further configured to graphically indicate each of the digital measurements of any selected paneprocessor determines a maximum average displacement and a minimum average displacement.

24. (Currently Amended) The device of Claim 23, wherein the processor determines a runout based upon a selected panethe difference between the maximum average and the minimum displacement average displacement.

25. (Withdrawn.) A computer software program product for instructing a processor to determine a runout of a rotating tool based upon a signal from a transducer, the program product comprising:

first computer program code means for instructing a processor to store at a memory address an instantaneous value of a signal from a transducer in signal communication with the processor, the memory address being associated with a time of the instantaneous value, the transducer being configured to measure a displacement of a surface of a rotating tool;

second computer program code means for recognizing, from the stored instantaneous values and associated times, an ordered plurality of instantaneous values regularly and substantially repeating, the plurality of instantaneous values being a pattern;

third computer program code means for selecting a least value from the pattern for selecting a greatest value from the pattern;

fourth computer program code means for determining a difference between the greatest value and the least value; and

fifth computer program code means for indicating the difference.

26. (Withdrawn.) The computer program product of Claim 25, further comprising:

BLACK LOWE & GRAHAM PLLC
701 Fifth Avenue, Suite 4800
Seattle, Washington 98104
206.381.3300 • F: 206.381.3301

sixth computer program code means for receiving the pattern from the pattern recognizer;

seventh computer program code means for designating a first number representing a number of instantaneous values in the pattern;

eighth computer program code means for designating a second number less than the first number and greater than one, the second number being used to create a pane for performing a rolling averaging;

ninth computer program code means for performing a rolling averaging of the instantaneous values in the pattern, the rolling averaging resulting in a plurality of averaged values; and

tenth computer program code means for substituting the averaged values for the instantaneous values in the pattern such that the comparer will select a least averaged value and a greatest averaged value.

27. (Withdrawn.) The computer program product of Claim 26, wherein the second number is designated to optimize removal of noise.

28. (Withdrawn.) The computer program product of Claim 25, wherein the second computer program code means includes a pattern recognizer.

29. (Withdrawn.) The computer program product of Claim 25, wherein the third computer program code means includes a comparer.

30. (Withdrawn.) The computer program product of Claim 25, wherein the fourth computer program code means includes an arithmetic engine.

31. (Withdrawn.) The computer program product of Claim 26, wherein an averaging filter includes the sixth, seventh, eighth, ninth, and tenth computer program code means.

32. (Withdrawn.) The computer program product of Claim 26, further comprising an eleventh computer program code for statistical analysis of the instantaneous values.

BLACK LOWE & GRAHAM PLLC
701 Fifth Avenue, Suite 4800
Seattle, Washington 98104
206.381.3300 • F: 206.381.3301